

FIG. 1

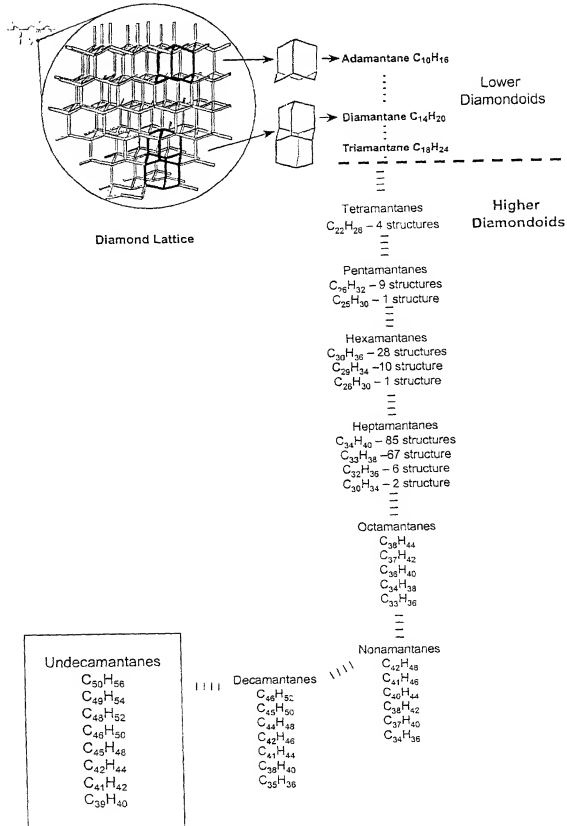


FIG. 2

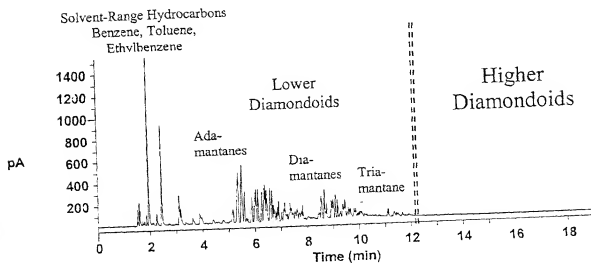
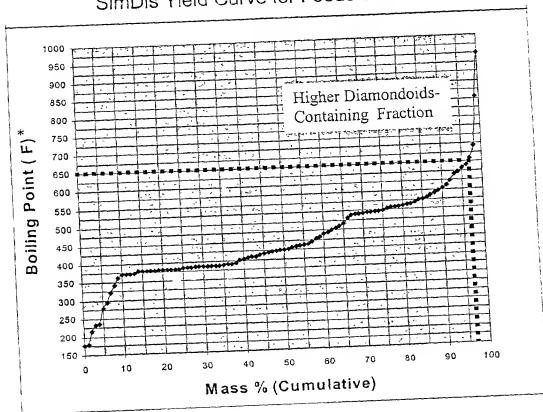


FIG. 3

SimDis Yield Curve for Feedstock B



* Atmospheric-Equivalent

FIG. 4

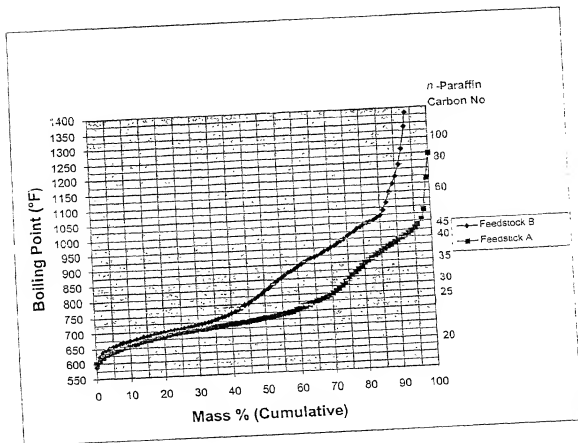


FIG. 5

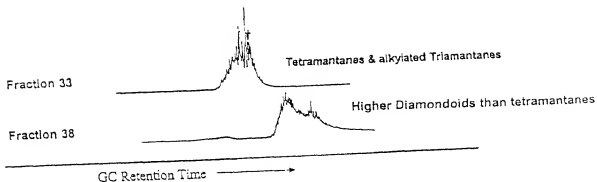


FIG. 6

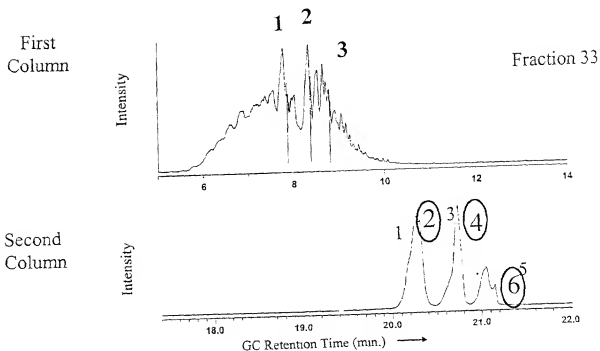


FIG. 7

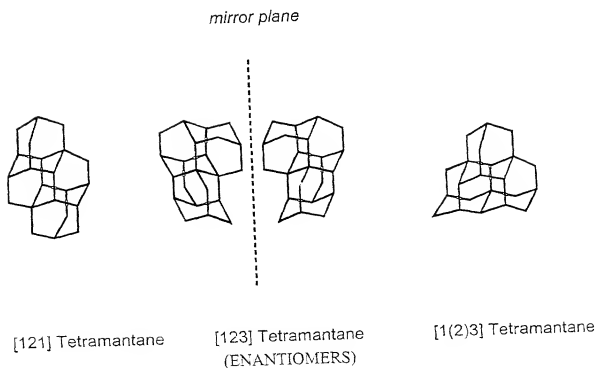


FIG. 8A

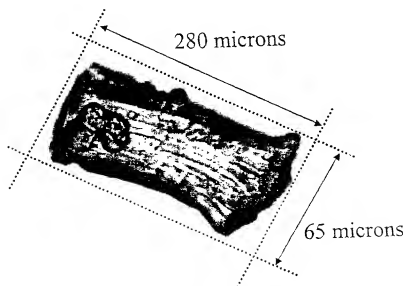


FIG. 8B

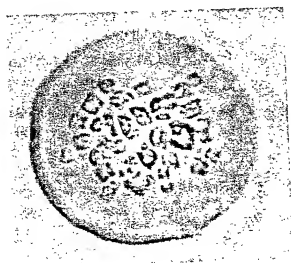


FIG. 8C

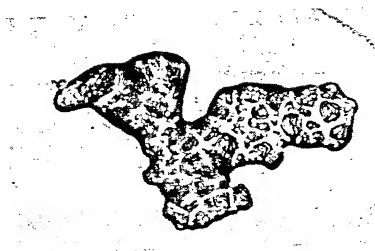


FIG. 9

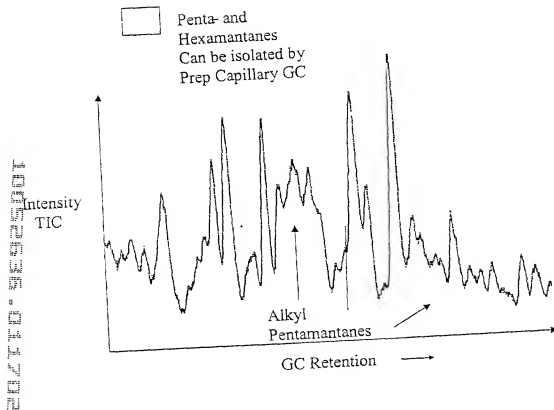


FIG. 10

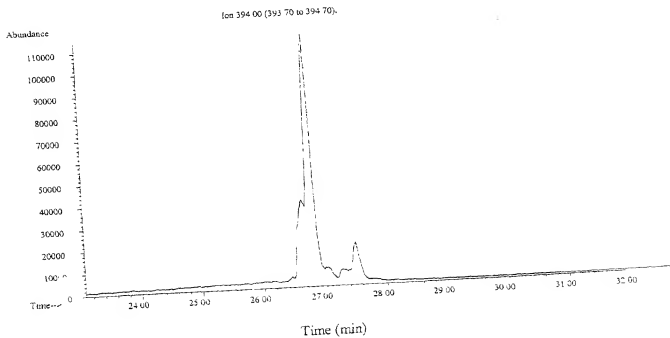


FIG. 11

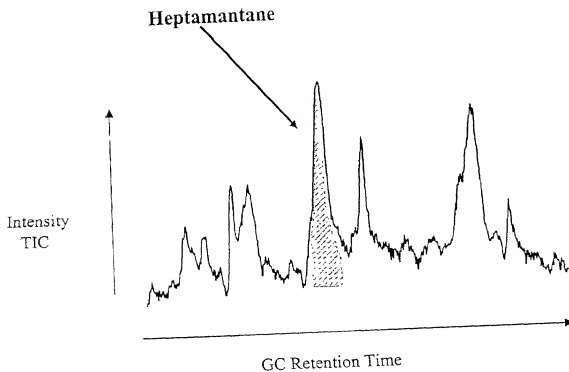


FIG. 12

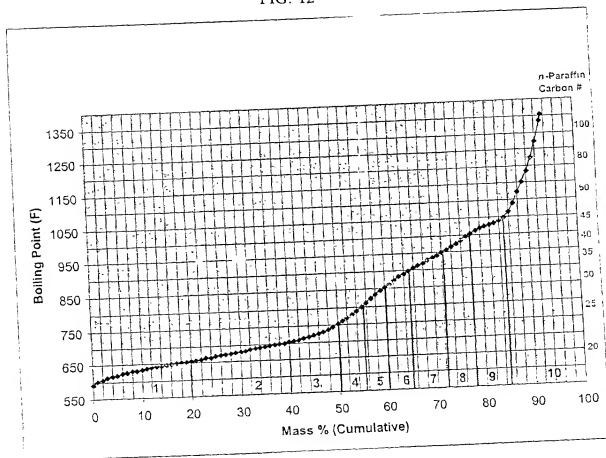


FIG. 13

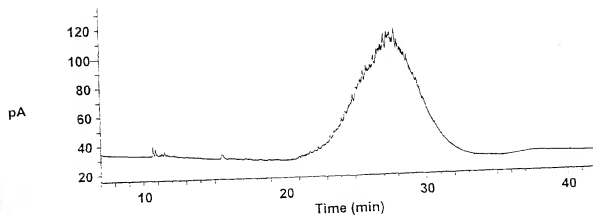


FIG. 14

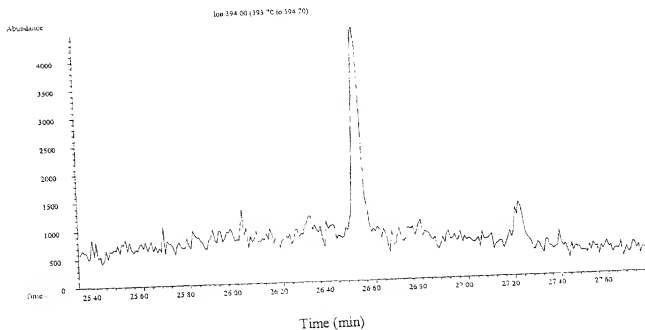


FIG. 15

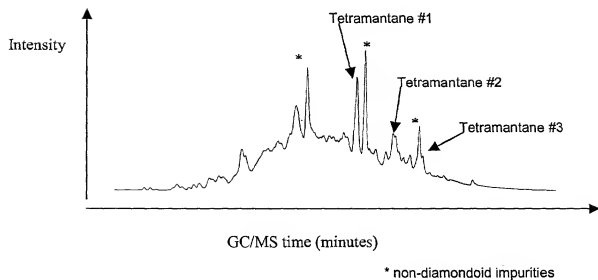


FIG. 16

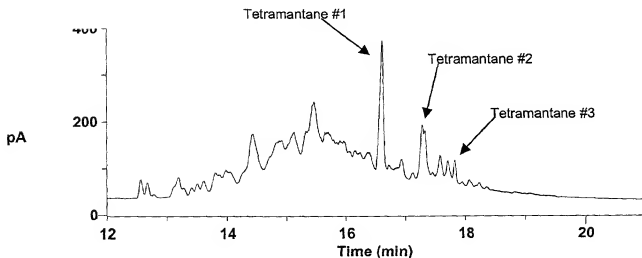


FIG. 17

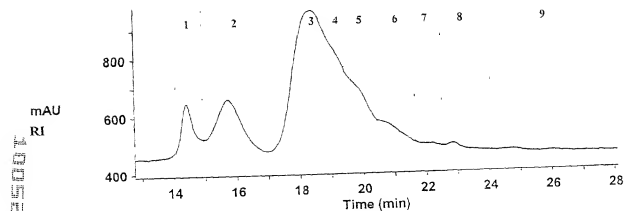


FIG. 18

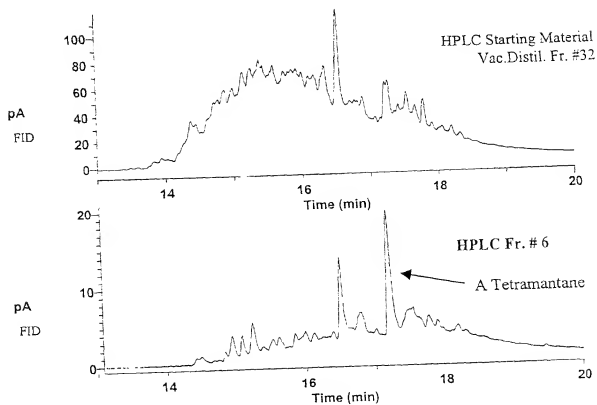


FIG. 19

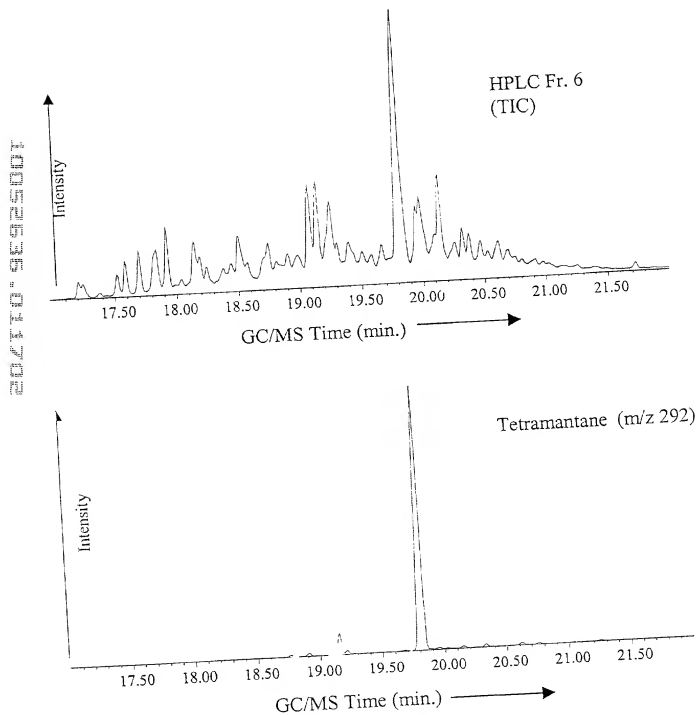


FIG. 20

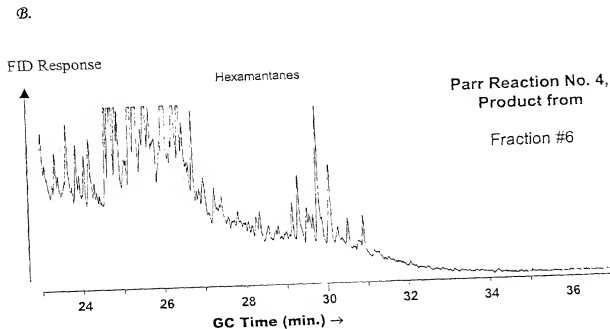
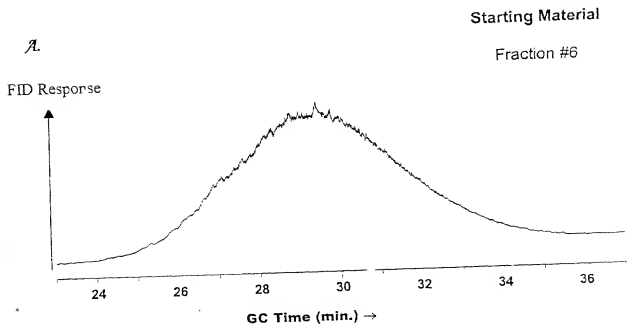


FIG. 21

Starting Material –
Feedstock B -Distillation
Cut #5 (Table 3B)

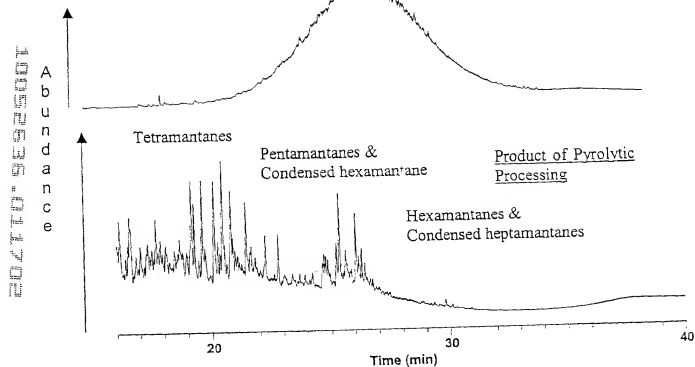


FIG. 22

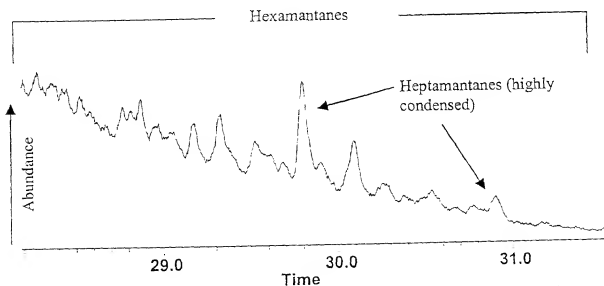


FIG. 23

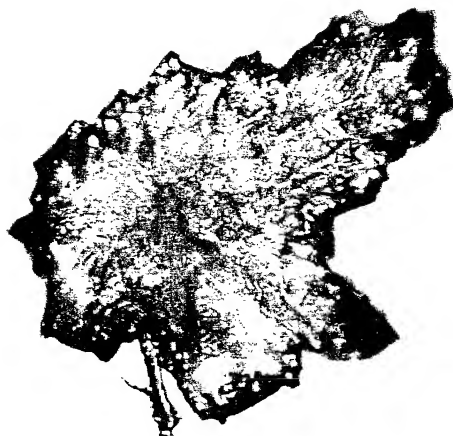


FIG. 24

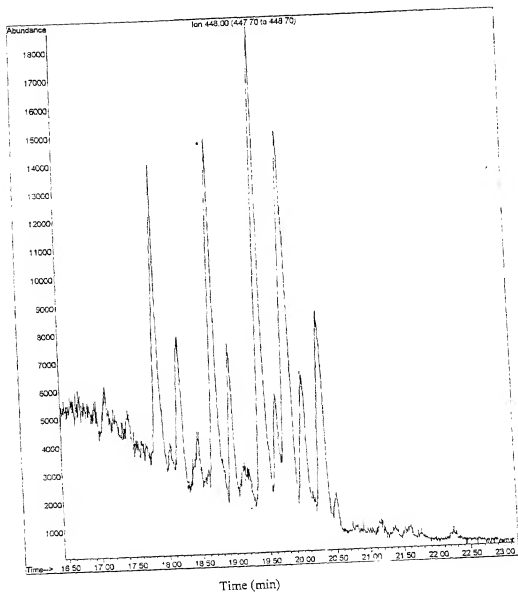
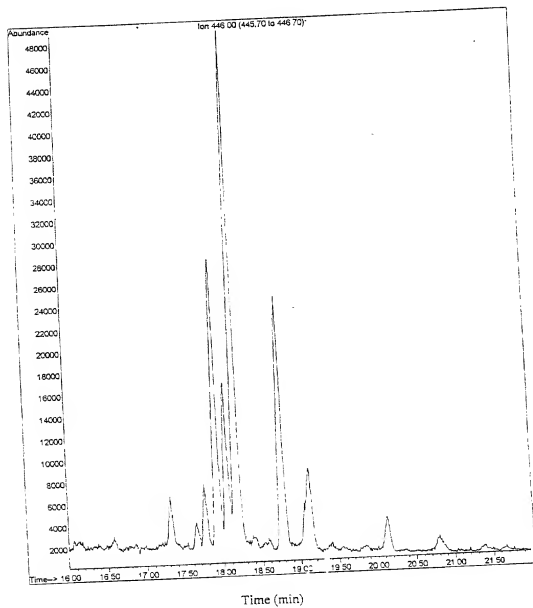


FIG. 25



APPLN. FILING DATE: JANUARY 17, 2002

TITLE: PROCESSES FOR THE PURIFICATION OF HIGHER DIAMONDODS
AND COMPOSITIONS COMPRISING SUCH DIAMONDODS

INVENTOR(S): DAHL, ET AL.

APPLICATION SERIAL NO: 005950-781

SHEET 17 of 34

FIG. 26

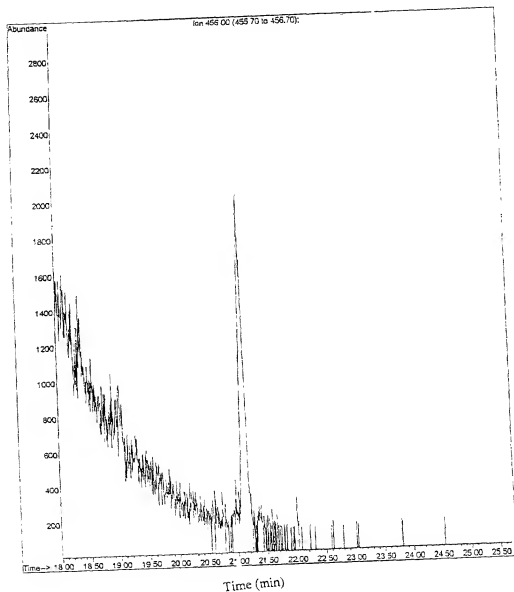
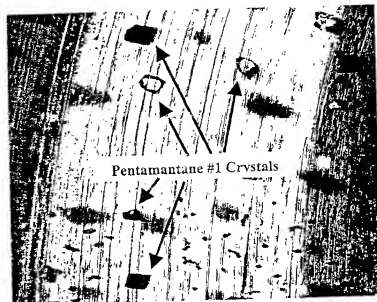
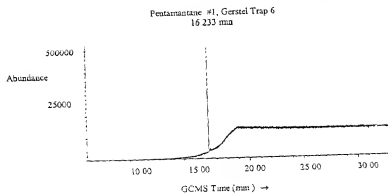


FIG. 27

A.



B.



C.

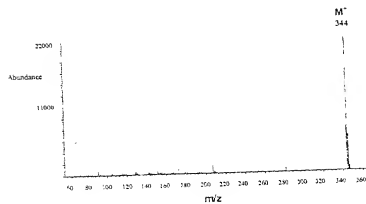
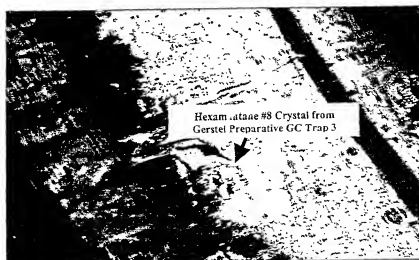
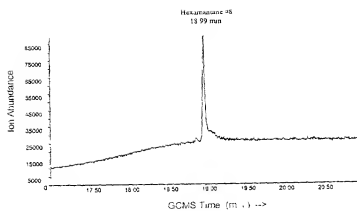


FIG. 28

A.



B.



C.

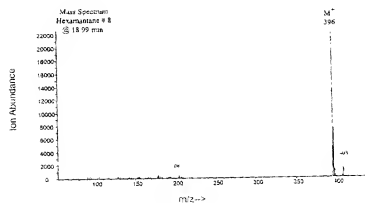


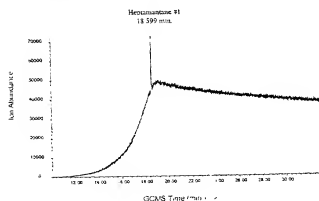
FIG. 29

A.



Heptamantane #1 Crystals

B.



C.

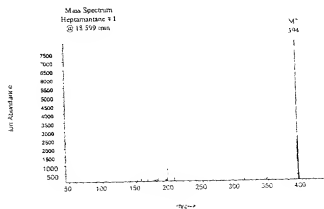


FIG. 30

Number of Diamond Crystal Cage Units	Number of Molecular Formulae	Higher Diamondoid	Molecular Weights							
			1	2	3	4	5	6	7	8
4		Tetramantane	292	344	330					
5		Pentamantane	344	396	382	342				
6		Hexamantane	396	448	434	394	420			
7		Heptamantane	448	500	486	446	420	432		
8		Octamantane	500	552	538	498	524	484	444	
9		Nonamantane	552	604	590	550	576	536	496	456
10		Decamantane	604	656	642	602	628	588	548	508
11		Undecamantane	656							534

Thermogenic Resid of Feedstock B (°F)

[illegible]

Hexamantane

Hex 6

FIG. 33

Hypercarb HPLC Fraction #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Fully Condensed Hexamantane
1																		
2																		
3																		
4																		
5																		
26													x					Hex 13
27																		
28																		Hex 14
29														x				Hex 1
30	x																	Hex 10
31																		Hex 11
32																		
33																		
34																		
35																		
43																		Hex 6
44																		
45																		
46																		
47																		
48																		Hex 15
49																		Hex 9
50																		
51																		
52																		
53																		Hex 2
54																		
55																		
56																		
57																		
58																		
59																		
60																		
61																		
62																		
72																		
73																		
74																		Hex 7
75																		
76																		
77																		
78																		
84																		

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FIG. 34

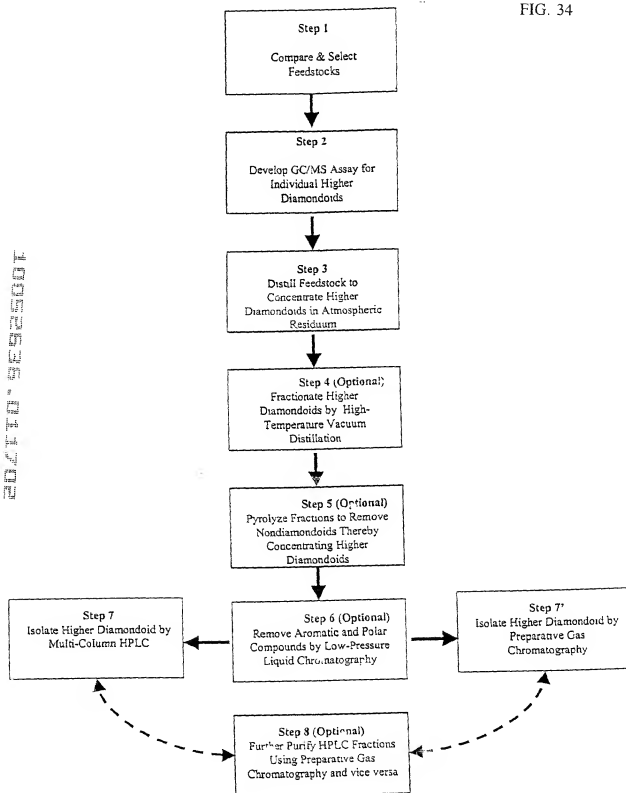


FIG. 35A

Higher Diamondoid	Compound Reference Number	M+ (m/z) (Equals Base Peak)	GC/MS Retention Times* (min.)	GC/MS Relative Retention Times** (min.)
Tetramantane #1	4-1	292	8.10	1.00
Tetramantane #2	4-2	292	8.66	1.07
Tetramantane #3	4-3	292	9.12	1.13
Pentamantane #1	5-1	344	10.40	1.28
Pentamantane #2	5-2	344	11.93	1.47
Pentamantane #3	5-3	344	11.98	1.48
Pentamantane #4	5-4	344	12.38	1.53
Pentamantane #5	5-5	344	12.50	1.54
Pentamantane #6	5-6	344	12.71	1.57
Cyclohexamantane	C-6	342	12.34	1.52
Hexamantane #1	6-1	396	14.46	1.76
Hexamantane #2	6-2	396	14.61	1.80
Hexamantane #3	6-3	396	14.97	1.85
Hexamantane #4	6-4	396	14.99	1.85
Hexamantane #5	6-5	396	15.04	1.86
Hexamantane #6	6-6	396	15.13	1.87
Hexamantane #7	6-7	396	15.22	1.88
Hexamantane #8	6-8	396	15.32	1.89
Hexamantane #9	6-9	396	15.42	1.90
Hexamantane #10	6-10	396	15.45	1.91
Hexamantane #11	6-11	396	15.49	1.91
Hexamantane #12	6-12	396	15.54	1.92
Hexamantane #13	6-13	396	15.60	1.93
Hexamantane #14	6-14	396	15.81	1.95
Hexamantane #15	6-15	396	15.89	1.96
Hexamantane #16	6-16	396	16.05	1.98
Hexamantane #17	6-17	396	16.08	1.99
Heptamantane #1	7-1	394	14.96	1.85
Heptamantane #2	7-2	394	15.53	1.92
Heptamantane #3	7-3	448	17.34	2.14
Heptamantane #4A	7-4A	448	17.70	2.18
Heptamantane #4B	7-4B	448	17.70	2.18
Heptamantane #5	7-5	448	17.71	2.19
Heptamantane #6	7-6	448	17.79	2.20
Heptamantane #7	7-7	448	17.82	2.20
Heptamantane #8	7-8	448	17.99	2.22
Heptamantane #9A	7-9A	448	18.13	2.24
Heptamantane #9B	7-9B	448	18.13	2.24
Heptamantane #9C	7-9C	448	18.13	2.24
Heptamantane #10	7-10	448	18.15	2.24
Heptamantane #11	7-11	448	18.20	2.25
Heptamantane #12	7-12	448	18.21	2.25
Heptamantane #13A	7-13A	448	18.29	2.26
Heptamantane #13B	7-13B	448	18.29	2.26
Heptamantane #13C	7-13C	448	18.29	2.26
Heptamantane #14	7-14	448	18.32	2.26

FIG. 35A cont'd

Higher Diamondoid	Compound Reference Number	M+ (m/z) (Equals Base Peak)	GC/MS Retention Times* (min.)	GC/MS Relative Retention Times** (min.)
Octamantane #1	8-1	446	17.30	2.14
Octamantane #2	8-2	446	17.37	2.14
Octamantane #3	8-3	446	17.42	2.15
Octamantane #4	8-4	446	17.47	2.16
Octamantane #5	8-5	446	17.71	2.19
Octamantane #6	8-6	446	17.82	2.20
Octamantane #7	8-7	446	17.86	2.20
Octamantane #8	8-8	446	18.22	2.25
Octamantane #9	8-9	446	18.46	2.28
Octamantane #10	8-10	446	18.65	2.30
Octamantane #11	8-11	446	18.76	2.32
Nonamantane #1	9-1	498	19.86	2.45
Decamantane #1	10-1	456	18.57	2.29
Decamantane #2	10-2	496	21.33	2.63
Undecamantane#1	11-1	508	21.05	2.60

* HP-MS5 (30m X 0.25 mm, 0.25 micron film), helium carrier gas.

** Reference to Tetramantane #1

FIG. 35B

Higher Diamondoid	Compound Reference Number	Fraction Number	Elution Time (min.)	Elution Volume (mL)	Elution Volume Relative to 4-1
Tetramantane #1	4-1	4	119	59:	1.00
Tetramantane #2	4-2	7	125	627	1.05
Tetramantane #3	4-3	6	123	616	1.04
Pentamantane #1	5-1	11	134	669	1.13
Pentamantane #2	5-2	19	151	754	1.27
Pentamantane #3	5-3	28	170	850	1.43
Pentamantane #4	5-4	22	157	786	1.32
Pentamantane #5	5-5	19	151	754	1.27
Pentamantane #6	5-6	20	153	765	1.29
Cyclohexamantane	6-6	23	159	797	1.34
Hexamantane #1	6-1	33	181	903	1.52
Hexamantane #2	6-2	29	172	861	1.45
Hexamantane #3	6-3	43	202	1012	1.70
Hexamantane #4	6-4	33	181	903	1.52
Hexamantane #5	6-5	35	185	924	1.56
Hexamantane #6	6-6	63	242	1211	2.04
Hexamantane #7	6-7	37	189	945	1.59
Hexamantane #8	6-8	39	193	967	1.63
Hexamantane #9	6-9	39	193	967	1.63
Hexamantane #10	6-10	48	214	1071	1.80
Hexamantane #11	6-11	36	187	935	1.57
Hexamantane #12	6-12	44	205	1024	1.72
Hexamantane #13	6-13	36	187	935	1.57
Hexamantane #14	6-14	39	193	967	1.63
Hexamantane #15	6-15	45	207	1036	1.74
Hexamantane #16	6-16	44	205	1024	1.72
Hexamantane #17	6-17	49	217	1083	1.82
Heptamantane #1	7-1	45	207	1036	1.74
Heptamantane #2	7-2	41	198	989	1.66
Heptamantane #3	7-3	61	238	1190	2.00
Heptamantane #4A	7-4A	90	304	1519	2.56
Heptamantane #4B	7-4B	90	304	1519	2.56
Heptamantane #5	7-5	76	270	1349	2.27
Heptamantane #6	7-6	67	251	1253	2.11
Heptamantane #7	7-7	—	—	—	—
Heptamantane #8	7-8	59	234	1172	1.97
Heptamantane #9A	7-9A	60	236	1181	1.99
Heptamantane #9B	7-9B	62	240	1200	2.02
Heptamantane #9C	7-9C	78	274	1370	2.31
Heptamantane #10	7-10	86	291	1455	2.45
Heptamantane #11	7-11	—	—	—	—
Heptamantane #12	7-12	—	—	—	—
Heptamantane #13A	7-13A	58	233	1163	1.96
Heptamantane #13B	7-13B	74	266	1328	2.24
Heptamantane #13C	7-13C	90	304	1519	2.56
Heptamantane #14	7-14	70	257	1285	2.16

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FIG. 35B cont'd

Higher Diamondoid	Compound Reference Number	Fraction Number	Elution Time (min.)	Elution Volume (mL)	Elution Volume Relative to 4-1
Octamantane #1	8-1	81	280	1402	2.36
Octamantane #2	8-2	83	285	1423	2.40
Octamantane #3	8-3	84	244	1221	2.06
Octamantane #4	8-4	—	—	—	—
Octamantane #5	8-5	83	242	1211	2.04
Octamantane #6	8-6	79	276	1381	2.32
Octamantane #7	8-7	71	259	1296	2.18
Octamantane #8	8-8	84	287	1434	2.41
Octamantane #9	8-9	74	266	1328	2.24
Octamantane #10	8-10	80	280	1402	2.36
Octamantane #11	8-11	85	289	1445	2.43
Nonamantane #1	9-1	89	297	1487	2.50
Decamantane #1	10-1	83	285	1423	2.40
Decamantane #2	10-2	—	—	—	—
Undecamantane#1	11-1	101	355	1774	2.99

ODS HPLC Whatman ODS-II 10/50

(2 Columns in series), acetone mobile phase @5.0 mL/min.

FIG. 36

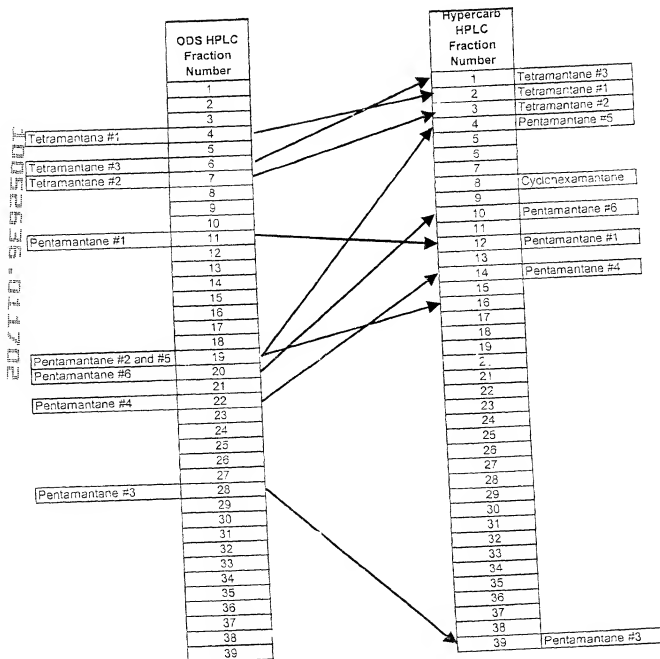


FIG. 37

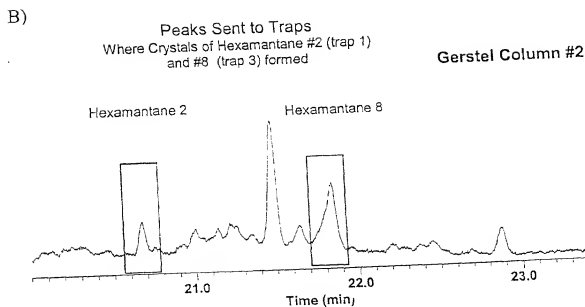
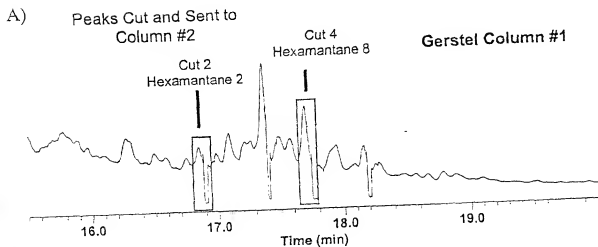


FIG. 38

A)

Crystal of Nonamantane (Mol. Wt. 498)



B)

Mass Spectrum of Dissolved Crystal of Nonamantane
 Retention time 19.83 min.

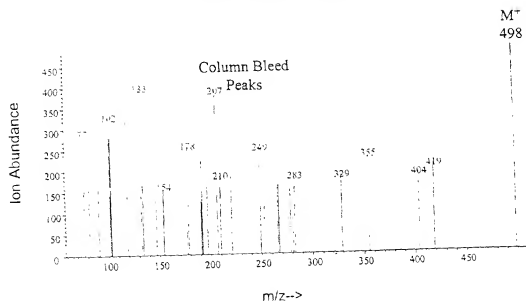
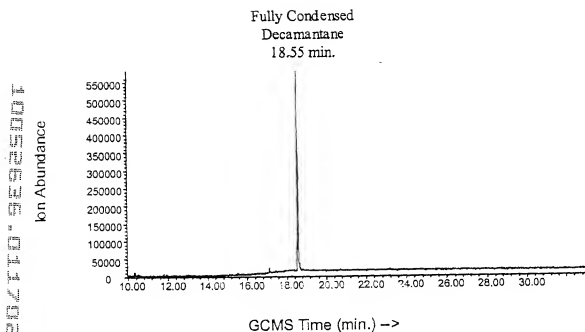


FIG. 39

Total Ion Chromatogram

A)



B)

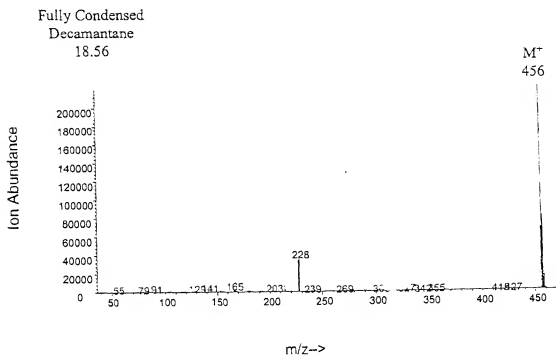
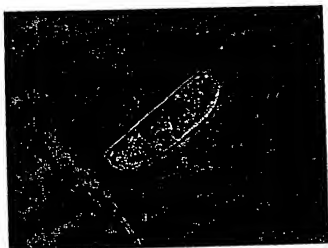


FIG. 40

A)

Crystal of Fully Condensed Decamantane



B)

Mass Spectrum of Dissolved Crystal of Fully Condensed Decamantane
Retention time 18.54 min.

